

PATENT ABSTRACTS OF JAPAN

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(54) FLAME RETARDANT POLYSTYRENE RESIN COMPOSITION

(57)Abstract:

PURPOSE: To obtain the subject composition excellent in molding processability by adding specific amounts of decabromodiphenylethane, tetrabromobisphenol A and antimony trioxide to an impact-resistant polystyrene resin.

CONSTITUTION: The objective composition is obtained by blending 100 pts.wt. impact-resistant polystyrene resin (e.g. a well-known rubber-reinforced polystyrene resin) with 6-10 pts.wt. decabromodiphenylethane, 4-6 pts.wt. antimony trioxide and 10-14 pts.wt. tetrabromobisphenol A.

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CLAIMS

[Claim(s)]

[Claim 1] They are the deca BUROMO bibenzyl 3 - 15 weight sections to the high-impact-polystyrene resin 100 weight section. Fire-resistant polystyrene resin constituent excellent in the fabricating-operation nature which comes to add tetrabromobisphenol A 3 - 20 weight sections, and an antimony trioxide 3 - 8 weight sections.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

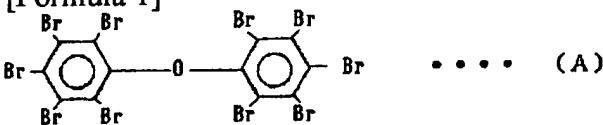
[Industrial Application] Especially this invention relates to the polystyrene resin constituent excellent in fire retardancy and fabricating-operation nature about a fire-resistant polystyrene resin constituent.

[0002]

[Description of the Prior Art] About the plastic part for which fire retardancy is needed [housing / of a television set] highly, the resin constituent which passes "V-0" rank of U.S. undershirt rye TAZU laboratory company UL-94 specification is used conventionally. Generally as this resin constituent, what blended the organic halogen system flame retarder and the antimony trioxide with the high-impact-polystyrene resin is used. Especially as an organic halogen system flame retarder, the decabromodiphenyl ether shown with the following structure expression A is used widely.

[0003]

[Formula 1]



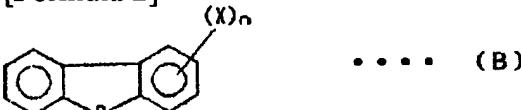
[0004] As shown in the (2) above-mentioned structure expression (A) with (1) price cheap as a reason decabromodiphenyl ether is used widely,; excellent in; (3) thermal resistance with high bromine content (inside of 1 molecule) required to give fire retardancy etc. is mentioned. From these reasons, decabromodiphenyl ether has usually been added as a flame retarder in the fire-resistant polystyrene currently used for electrical machinery and apparatus.

[0005]

[Problem(s) to be Solved by the Invention] However, it argues about the problem of the dioxin which is a toxic substance centering on Europe these days, and reexamination is needed about use of decabromodiphenyl ether. The matter generally called dioxin is expressed with the following structure expressions.

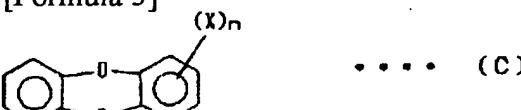
[0006]

[Formula 2]



[0007]

[Formula 3]



[0008] In addition, in an upper formula, x shows a halogen atom.

[0009] Possibility that the dioxin expressed with the above-mentioned structure expression (B) or the above-mentioned structure expression (C) will occur is pointed out by oxidizing decabromodiphenyl ether by combustion etc. so that clearly from the above-mentioned structure expression (A). For this reason, a flame retarder replaced with decabromodiphenyl ether has been desired widely.

[0010] On the other hand, in the field of a television set, television of a big screen is becoming in use in recent years, for example corresponding to high-definition television broadcasting, projection TV, etc. For this reason, in case housing of large-sized television etc. is fabricated, the more excellent fabricating-operation nature is needed.

[0011] In addition, the fire-resistant polystyrene resin constituent which comes to add tetrabromobisphenol A (TBBA) and an antimony trioxide to a high impact polystyrene is indicated by Provisional Publication No. No. 40047 [53 to]. Moreover, the fire-resistant polystyrene resin constituent which comes to blend with Provisional Publication No. No. 68854 [54 to] the TBBA oligomer which TBBA and TBBA, and an alkyl halide are made to react to polystyrene resin, and is obtained is indicated. However, in these constituents, although the moldability was improved, it was not what can be satisfied about thermal resistance.

[0012] this invention was made in consideration of the trouble of the conventional technology mentioned above, does not have worries about dioxin generating, and was suitable for large-sized mold goods -- it aims at offering the fire-resistant polystyrene resin which has good fabricating-operation nature, intensity, thermal resistance, and fire retardancy

[0013]

[Means for Solving the Problem] That an above-mentioned trouble should be coped with, as a result of examining wholeheartedly the combination of various flame retarders and a fire-resistant assistant, by carrying out the amount combination of specification of a deca BUROMO bibenzyl, tetrabromobisphenol A, and the antimony trioxide as a flame retarder, respectively, this invention person etc. found out that the fire-resistant polystyrene resin which has the good fabricating-operation nature which there are no worries about dioxin generating, and was suitable for manufacture of large-sized mold goods could be offered, and completed this invention.

[0014] That is, this invention offers the fire-resistant polystyrene resin constituent excellent in the fabricating-operation nature which comes to add the deca BUROMO bibenzyl 3 - 15 weight sections, tetrabromobisphenol A 3 - 20 weight sections, and an antimony trioxide 3 - 8 weight sections to the high-impact-polystyrene resin 100 weight section.

[0015] Hereafter, this invention is explained in detail.

[0016] The high-impact-polystyrene resin used in this invention is well-known rubber reinforcement polystyrene resin, and can be manufactured based on a well-known method. Such a high-impact-polystyrene resin can be manufactured by, for example, carrying out the polymerization of the aromatic monochrome vinyl monomer to the bottom of existence of the rubber-like polymer mentioned later. Although especially a polymerization method is not limited to this, a bulk-polymerization method or a massive suspension-polymerization method can be used for it.

[0017] As an aromatic monochrome vinyl monomer used in this invention, alpha-alkylation styrene, such as nucleus alkylation styrene; alpha methyl styrenes, such as a styrene; o-methyl styrene, p-methyl styrene, m-methyl styrene, 2, 4-dimethyl styrene, ethyl styrene, and p-tert-butyl styrene, and an alpha-methyl-p-methyl styrene, etc. is mentioned.

[0018] A polybutadiene, a styrene-butadiene copolymer, etc. are mentioned as a rubber-like polymer used in this invention. this rubber-like polymer is conventionally blended with the above-mentioned styrene system polymer uniformly according to well-known technique -- having -- as a particulate material -- a styrene system polymerization -- the inside of the body distributes uniformly. Usually, curing units are supplied with an aromatic monochrome vinyl monomer like the above at the time of the polymerization of a styrene system polymer. The above-mentioned rubber-like polymer is preferably blended five to 10% of the weight two to 15% of the weight, in order to raise shock resistance.

[0019] this invention -- setting -- the above-mentioned high-impact-polystyrene resin 100 weight section -- receiving -- a deca BUROMO bibenzyl -- 3 - 15 weight section -- desirable -- 6 - 10 weight section, and an antimony trioxide 3 - 8 weight sections -- 4-6 weight section combination is carried out preferably. When a fire-resistant effect suitable when [fewer than the above-mentioned range] amount combination is carried out is not acquired but these flame retarders are blended so much conversely, it may have a bad influence on the physical properties of the moldings obtained, such as shock resistance. In addition, a deca BUROMO bibenzyl has Br content as high as 82% in a monad, and its 1% loss-in-quantity temperature is as high as 324 degrees C also about thermal resistance, and it has the property desirable as a flame retarder. Furthermore, even if a deca BUROMO bibenzyl heats, the yield of dioxin is below limit of detection. However, it is not indicated that sufficient fabricating-operation nature mentions later only by using only a deca BUROMO bibenzyl and an antimony trioxide.

[0020] then, in this invention, the above-mentioned high-impact-polystyrene resin 100 weight section is received further tetrabromobisphenol A 3 - 20 weight sections -- fabricating-operation nature is preferably improved still more preferably 8 - 16 weight section and by carrying out 10-14 weight section combination When desired fabricating-operation nature is not obtained when [which were] amount combination is carried out but it blends so much

conversely rather than it specifies here, it may have a bad influence on the physical properties of the mold goods obtained.

[0021] After being a Banbury mixer, a kneader, a roll, an extruder, etc. and carrying out melting kneading of each component, if needed, the fire-resistant polystyrene resin constituent of this invention pelletizes this, and is obtained.

[0022] In the constituent of this invention, in case melting kneading is carried out if needed, additives, such as other flame retarders, a fire-resistant assistant, lubricant, a thermostabilizer, a bulking agent, a release agent, a color, a pigment, an antistatic agent, and a plasticizer, can be added.

[0023] Housing of domestic electrification products, such as the use as which fire retardancy with the fire-resistant advanced polystyrene resin constituent of this invention obtained as mentioned above and fabricating-operation nature are required, for example, a television set, a refrigerator, and a videocassette recorder, a chassis or a cabinet, and a further are used suitable for electrical machinery and apparatus, such as a printer and a monitor, a panelboard, etc.

[0024]

[Example] Hereafter, although this invention is concretely explained based on an example and the example of comparison, these and do not limit the range of this invention.

[0025] It blended at a rate which shows examples 1-4 and an example of comparison 1 high-impact-polystyrene resin, a deca BUROMO bibenzyl, tetrabromobisphenol A (TBBA), and an antimony trioxide in Table 1, and by the single screw extruder, under the temperature of 200 degrees C, it pelletized, after carrying out melting kneading. Combination is shown in Table 1.

[0026]

[Table 1]

Table 1 (unit : weight section)

Fruit ** Example Example of comparison Combination component . 1 2 5 5 5 [0027] 3 4 1 Polystyrene Resin 100 100 100 100 100 Deca BUROMO Bibenzyl 12 10 8 6 15 TBBA 4 8 12 16 0 Antimony Trioxide 5 5 Injection molding of the pellet obtained as mentioned above was carried out at 210 degrees C of cylinder temperatures using injection-molding-machine information-separator80EPN (Toshiba Machine Co., Ltd. make), the test piece of a predetermined size was produced, and it examined about a melt flow rate, VIKATTO softening temperature, Izod impactive strength, and fire retardancy. Each examination was performed as follows.

[0028] Melt flow rate: A melt flow rate is ISO. R Based on 1133, it measured on 200 degrees C and the conditions of 5kg of loads.

VIKATTO softening temperature: VIKATTO softening temperature is ASTM. Based on 1525, it measured on condition that 1kg of loads, and the rate B.

Izod impactive strength: Izod impactive strength is ASTM. Based on D256, it measured using the test piece with a thickness [with a notch] of 6.4mm.

Fire retardancy: Fire retardancy was measured using the test piece with a thickness of 2mm based on UL-94 specification.

[0029] Each test result is shown in Table 2.

[0030]

[Table 2]

Table [] 2 fruit ** Example . Example of comparison Trial ** Term Eye 1 2 3 4 1 Melt flow rate (g/10min.) 6.5 9.6 14.0 16.5 3.5 Izod impactive strength (kg-cm/cm) 9.4 8.6 7.5 6.4 10.6 VIKATTO softening temperature (degree C) 99.5 96.1 91.6 88.5 104 Fire-resistant (UL-94) V0 VO VO VO VO . [0031] By carrying out specified quantity combination of a deca BUROMO bibenzyl, tetrabromobisphenol A, and the antimony trioxide showed that the high-impact-polystyrene resin which the melt flow rate which shows the degree of Shaku of fabricating-operation nature was improved, and held good shock-resistant intensity, thermal resistance, and fire retardancy was obtained so that clearly from the result shown in Table 2.

[0032]

[Effect of the Invention] As explained above, according to this invention, there are no worries about dioxin generating and the fire-resistant polystyrene resin which has the good fabricating-operation nature suitable for large-sized mold goods, intensity, thermal resistance, and fire retardancy can be offered.

[Translation done.]